

Steps:

Step 1: Industry receives the empty glass bottles and raw soda ingredients.

Step 2: the glass bottles are verified in a machine and are thoroughly washed which is filling in the soap water and draining out and then filling in the fresh water and draining out

Step 3: the bottles are left to dry and soda making starts

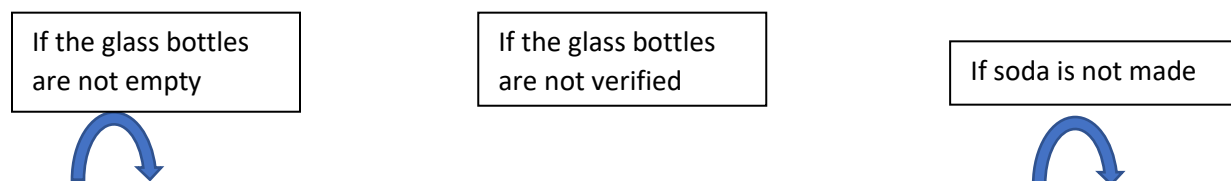
Step 4: the prepared soda is filled into the dried glass bottle with the help of soda filling machine

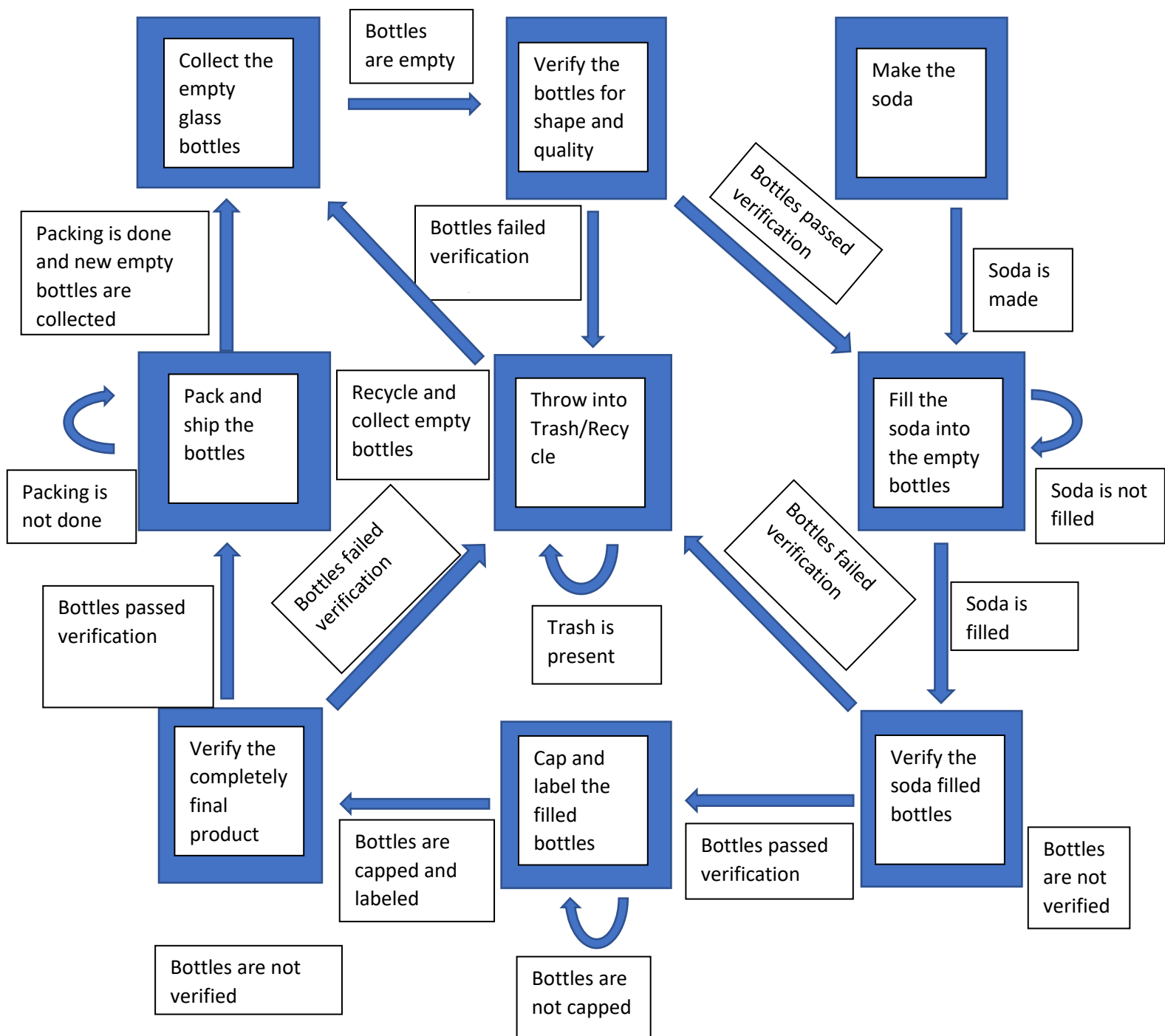
Step 5: the filled soda is sent into the soda level verification machine and the unfilled or bad soda bottles are segregated out

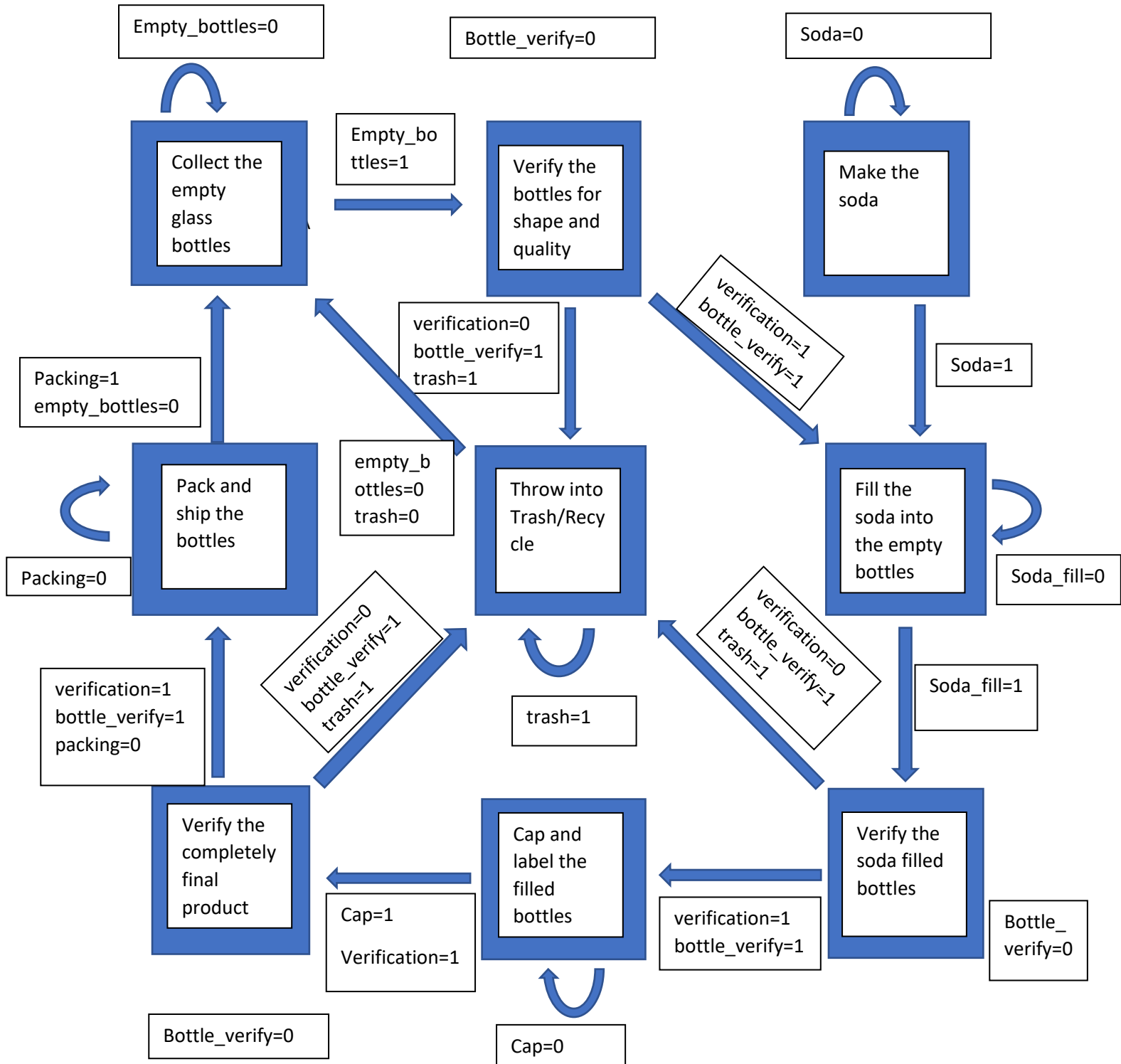
Step 6: the verified soda bottles are capped and labeled and then sent into the packaging

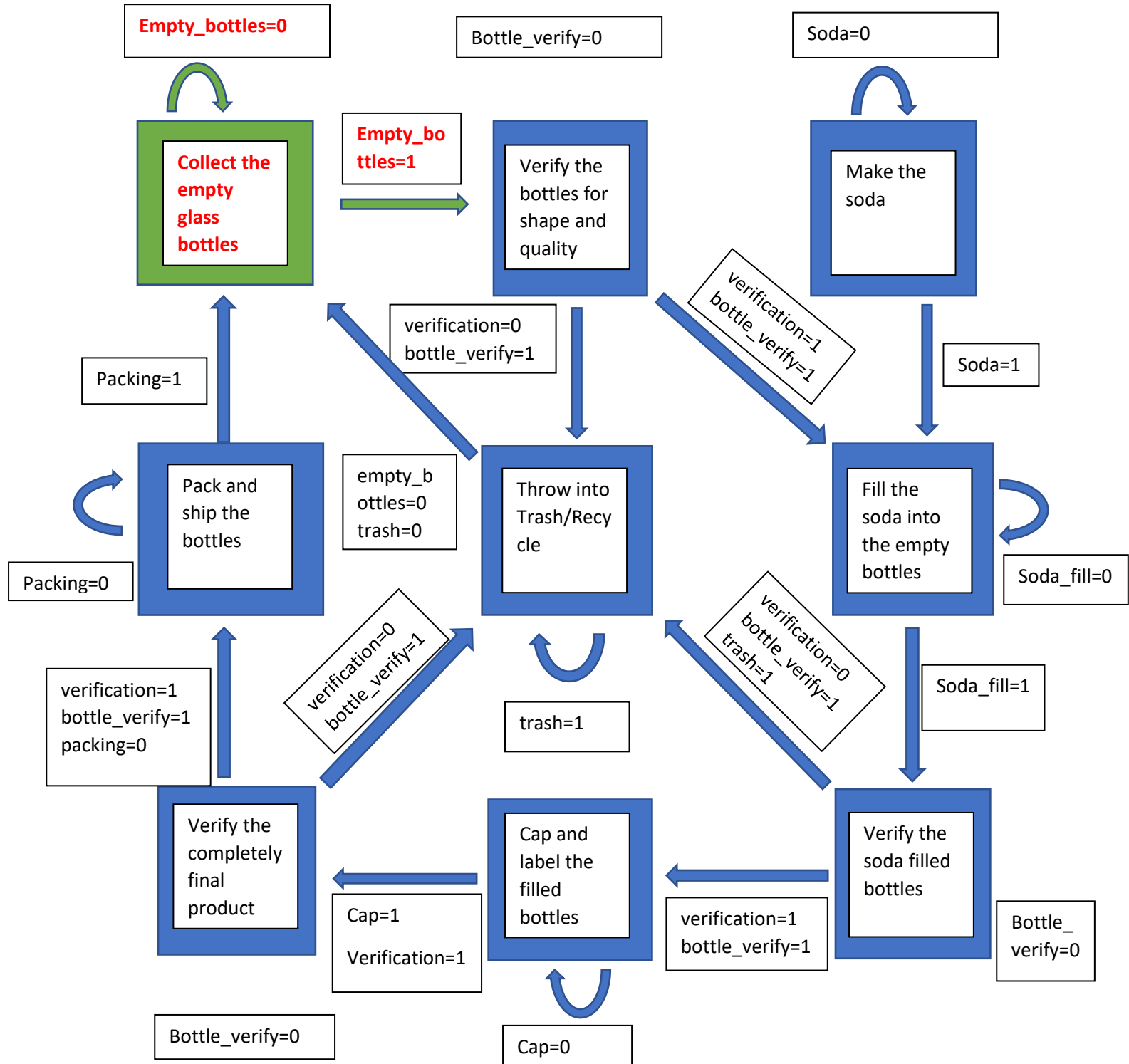
Step 7: the packaging is done and sent to the distributors

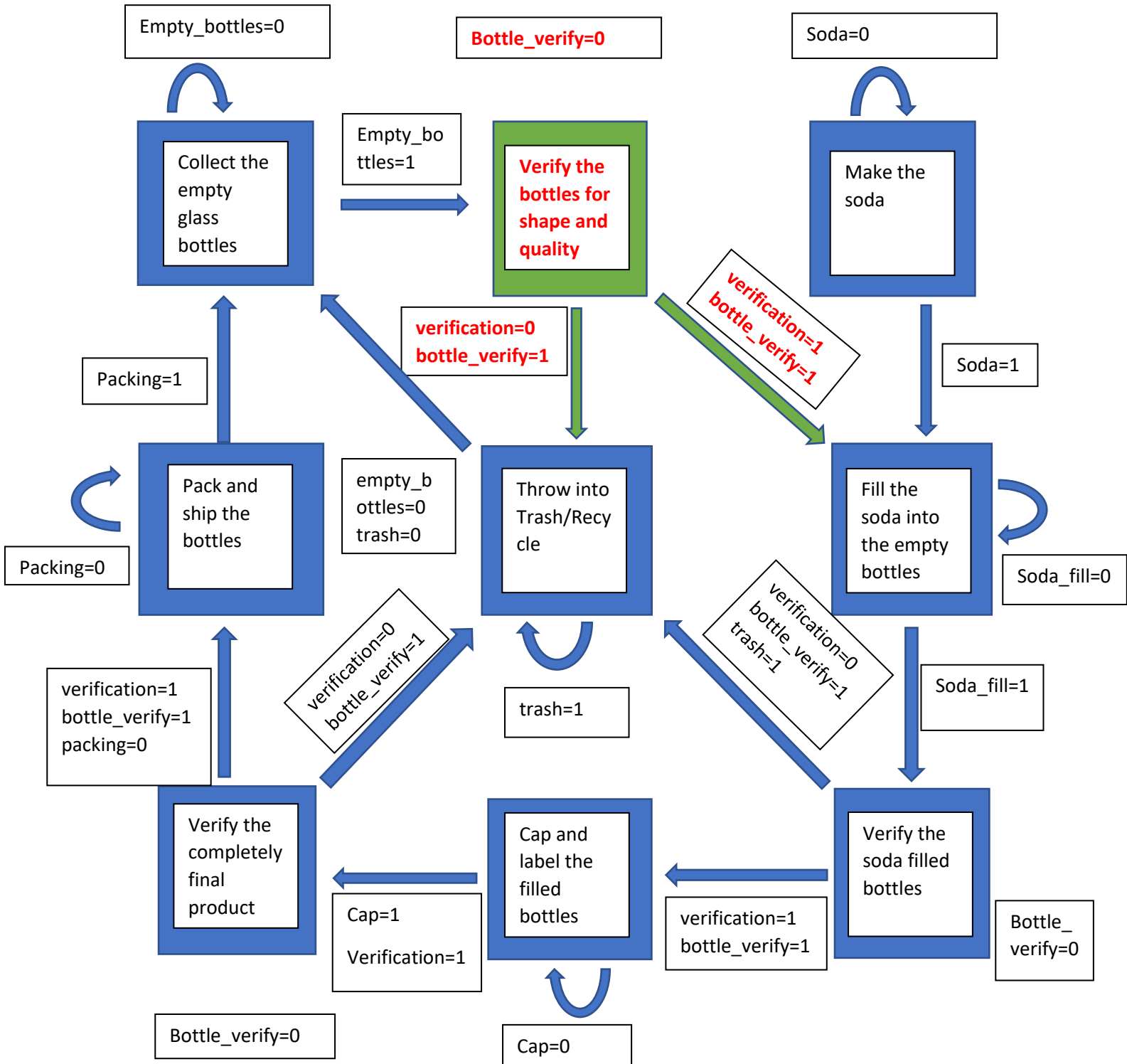
State Diagram

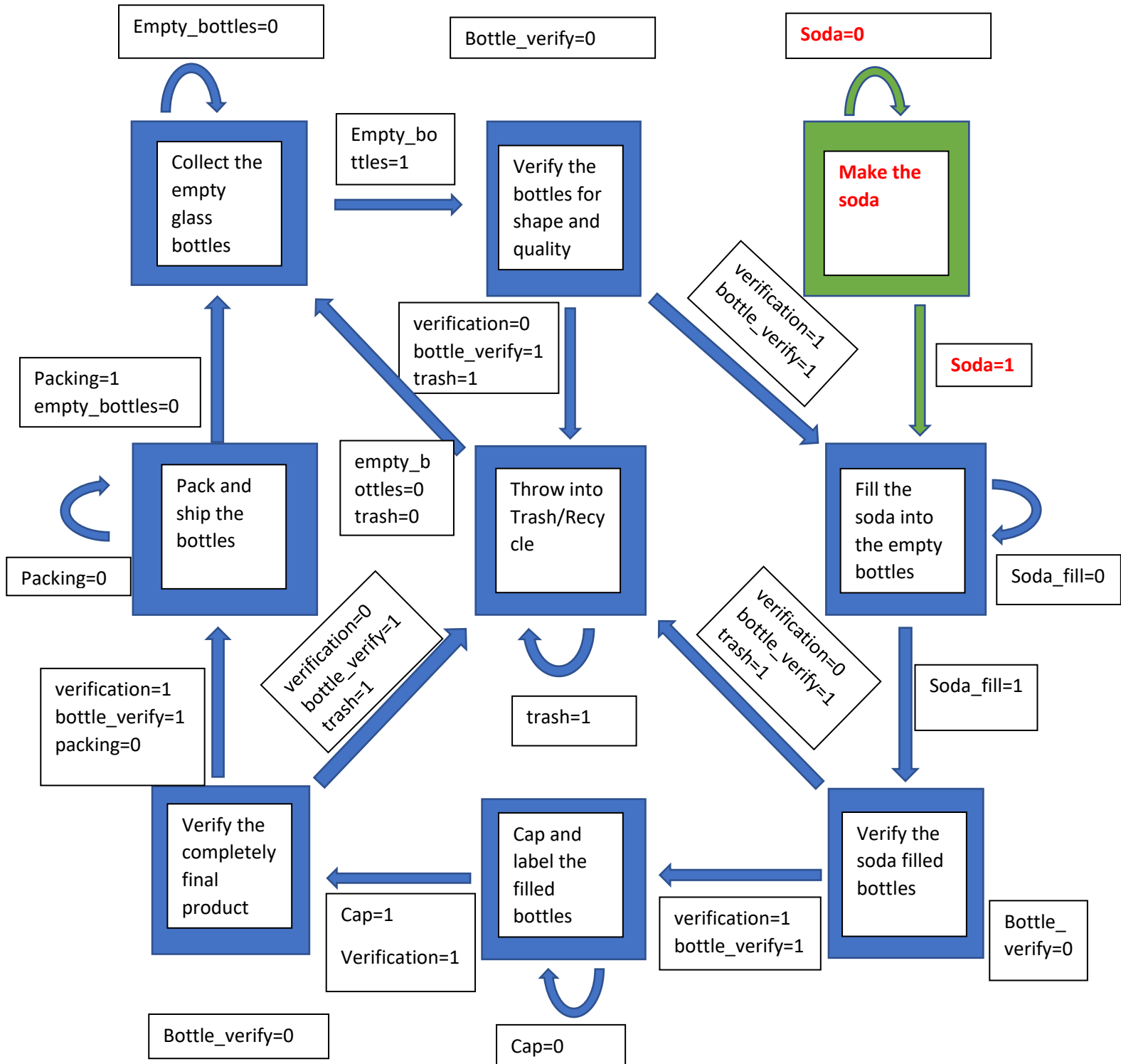


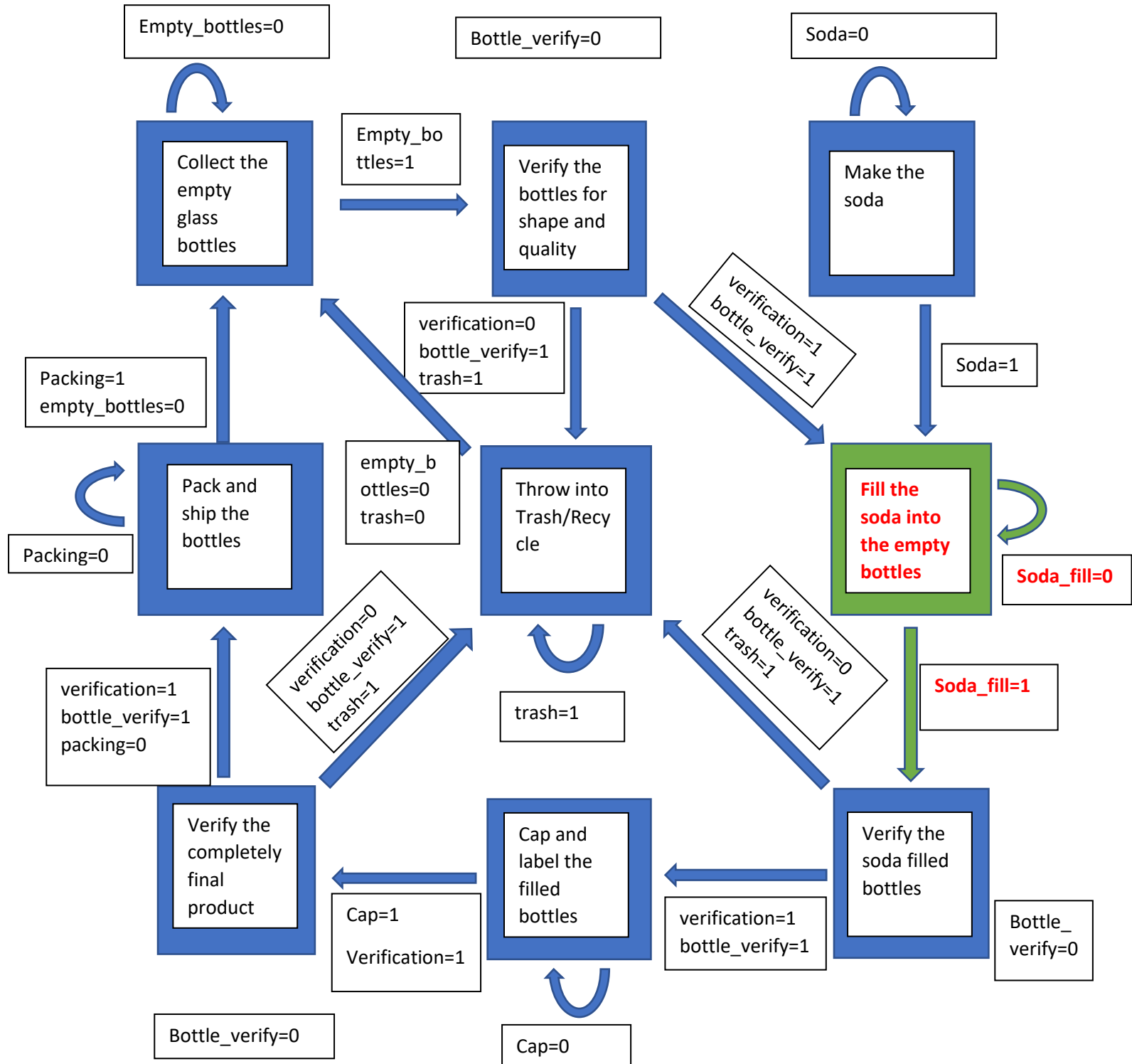


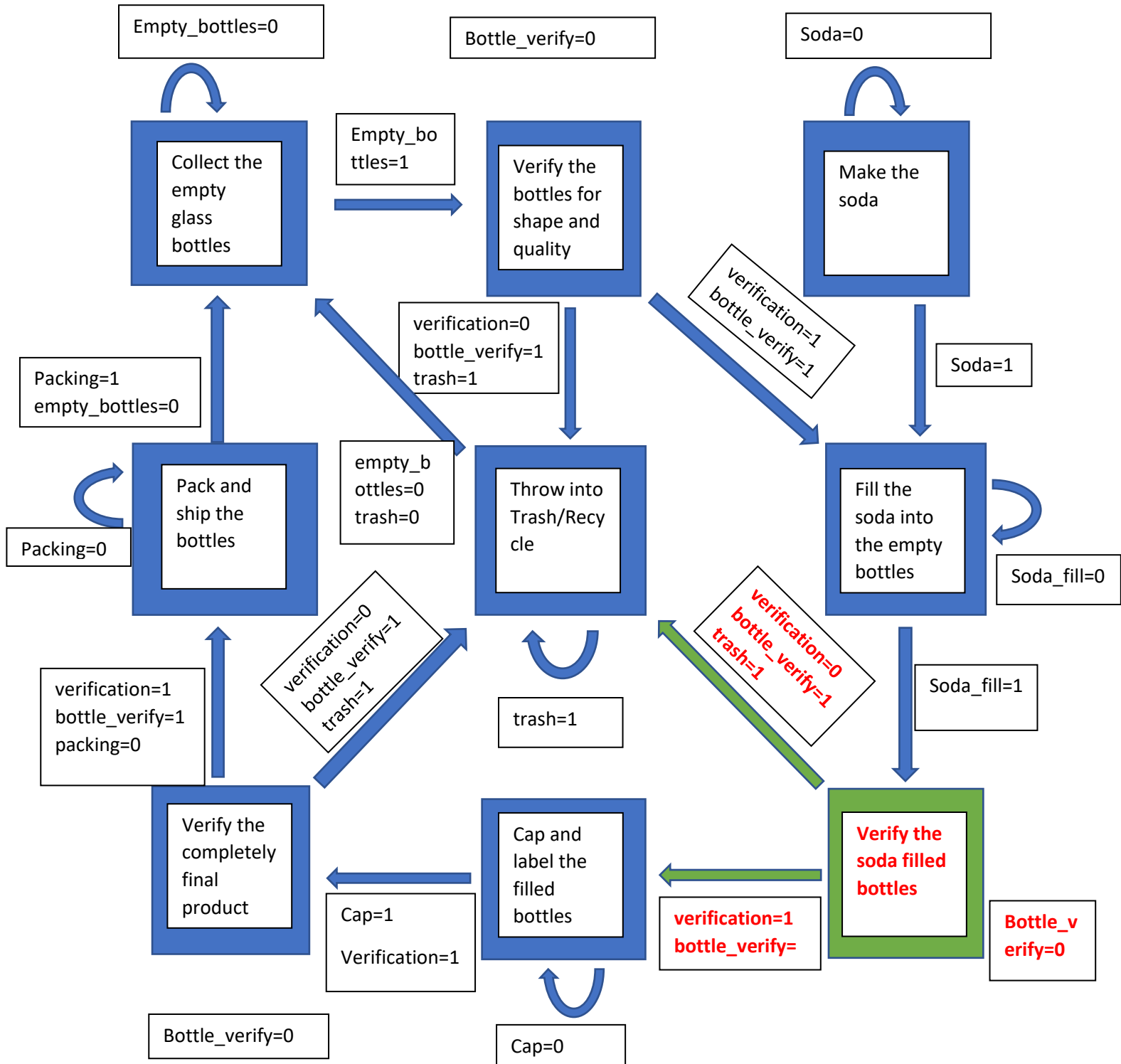


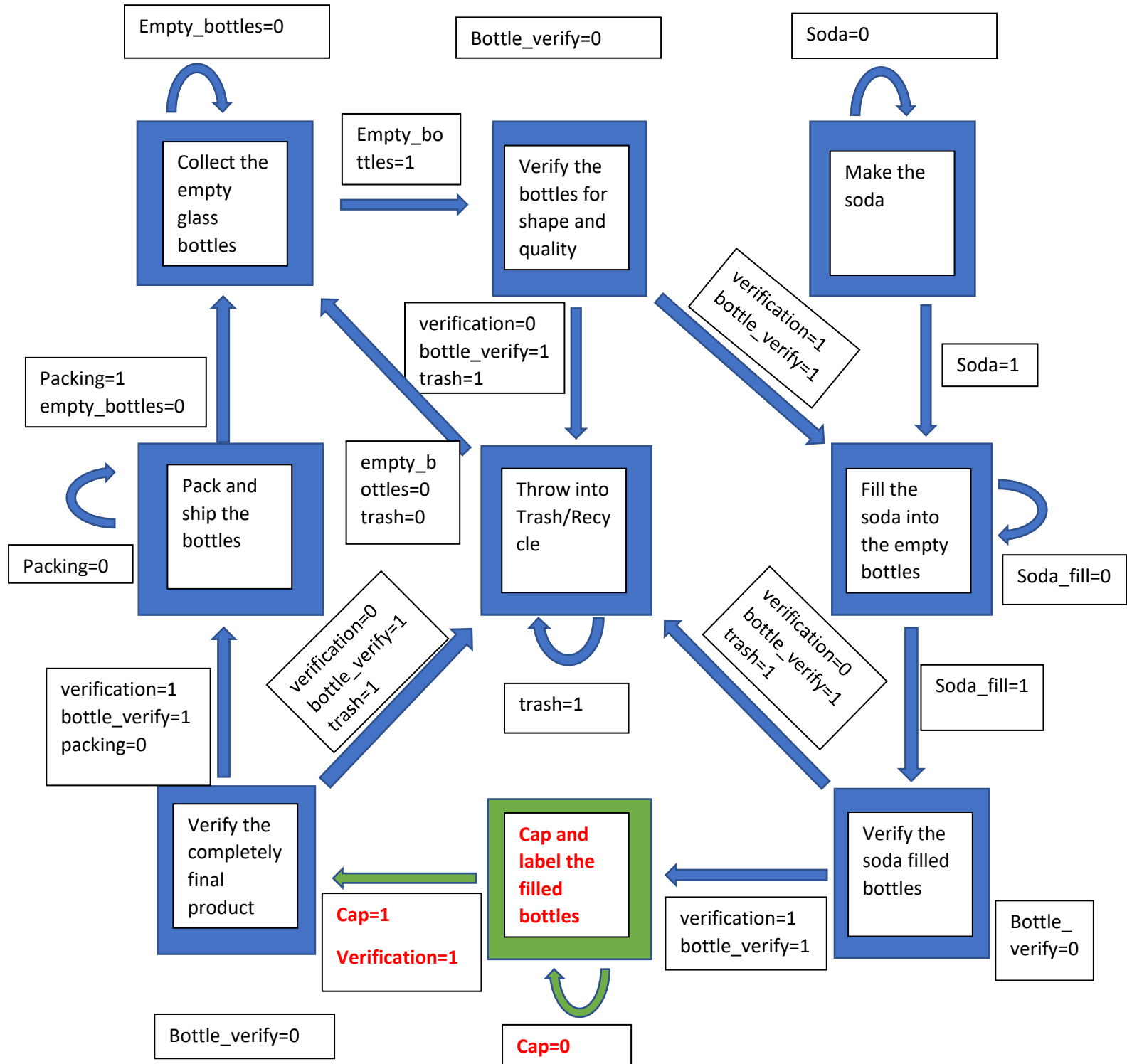


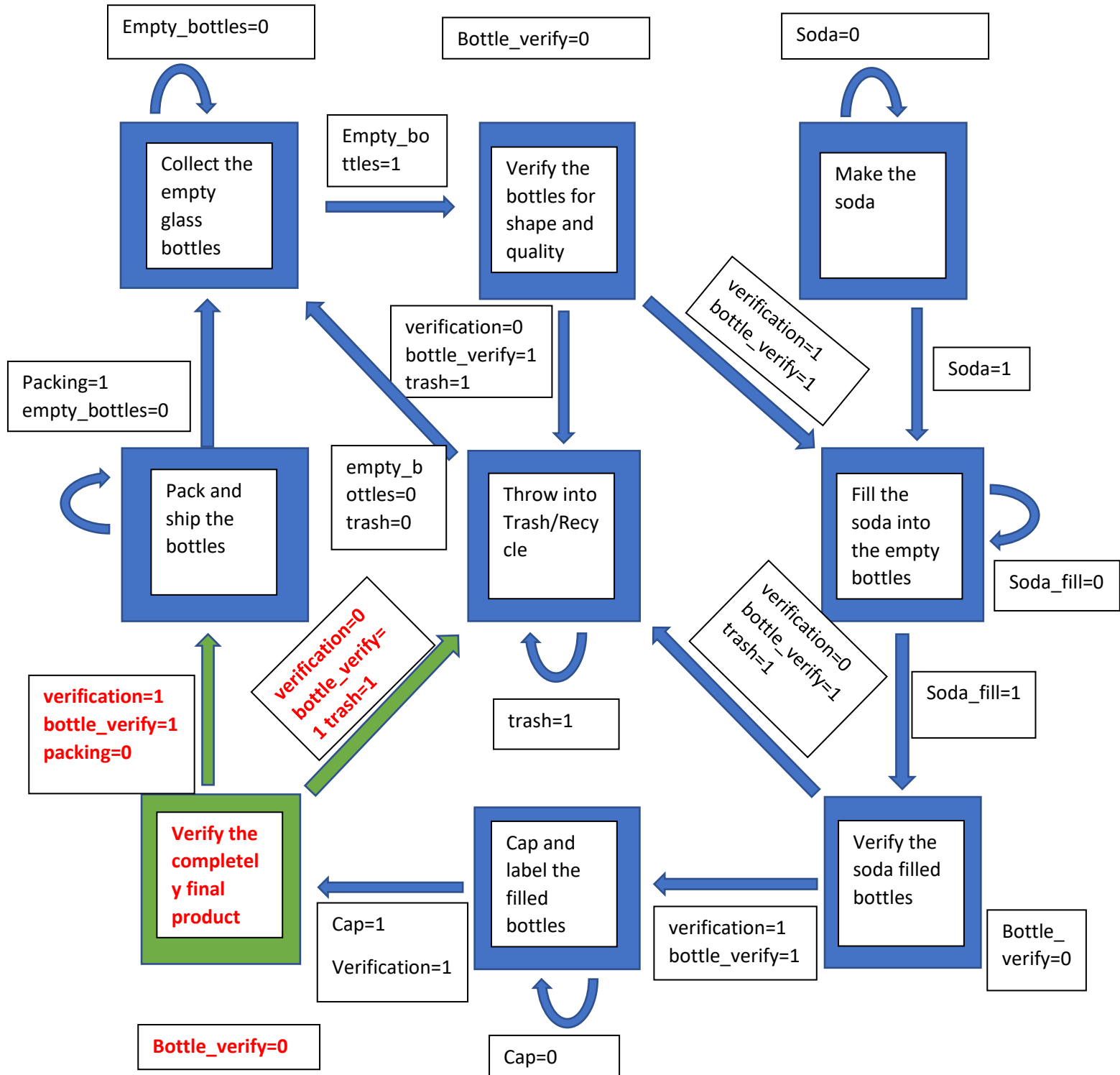


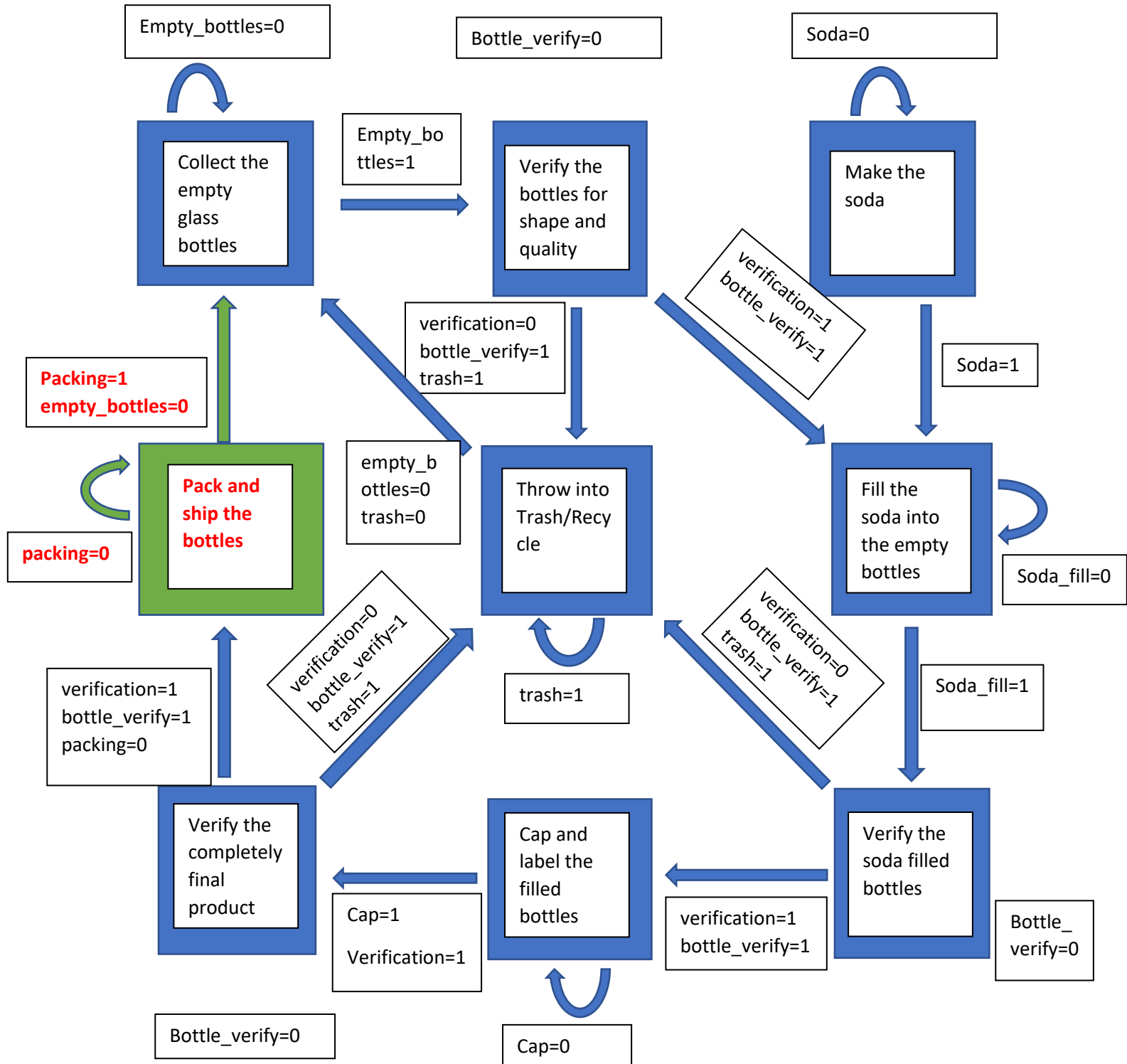


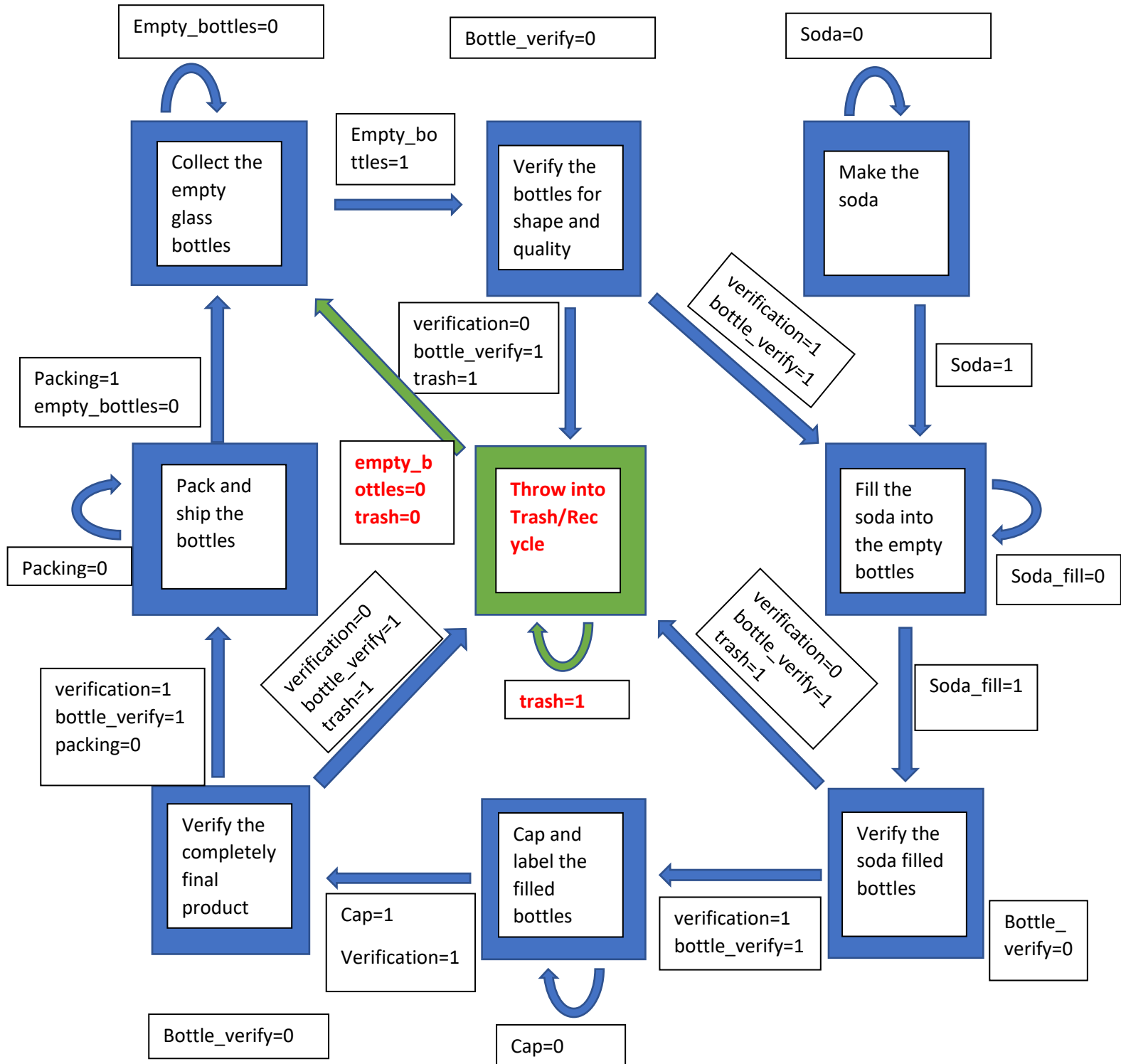












Verilog

```
module SodaMachine(clk,reset, empty_bottles, bottle_verify, soda, soda_filling, trash, verification, cap, packing);
```

```
input clk,reset,verification;
```

```
output reg empty_bottles, soda, soda_filling, trash, cap, packing;
```

```
//defining the states
```

```
parameter empty_bottles = 4'b0000;
```

```
parameter bottle_verify = 4'b0001;
```

```
parameter soda = 4'b0010;
```

```
parameter soda_filling = 4'b0011;
```

```
parameter soda_verification = 4'b0100;
```

```
parameter capping_labeling = 4'b0101;
```

```
parameter final_verification = 4'b0110;
```

```
parameter packing = 4'b0111;
```

```
parameter trash = 4'b1000;
```

```
reg[2:0] current_state, next_state;
```

```
always@(current_state or empty_bottles or soda)
```

```
begin
```

```
    case(current_state)
```

```
        //in the first state the empty bottles are collected.
```

```
        //if they are collected then bottles are sent to next state which is verification for size and shape
```

//else they are recycled and again re-collected

empty_bottles:

if(empty_bottles==0&&trash==0&&packing==1)

begin

next_state=bottle_verify;

empty_bottles=1;

bottle_verify=0;

trash=1;

packing=0;

end

else

begin

next_state=current_state;

empty_bottles=0;

trash=0;

packing=1;

end

//in this state the empty bottles are verified for shape and size.

//if they are verified as okay then bottles are sent to next state which is soda filling state

//else they are sent into trash and are re-cycled

bottle_verify:

if(empty_bottles==1&&bottle_verify==0&&verification=1)

begin

next_state=soda_filling;

bottle_verify=1;

soda=1;

empty_bottles=0;

end;

else

```

        begin
            next_state=trash;
            bottle_verify=1;
            soda=0;
            empty_bottles=1;
        end
//in this state the soda is prepared.
//if soda is prepae it is sennt to next state which is soda filling state
//else it is refilled

soda:
    if (soda==0)
        begin
            next_state=soda_filling;
            soda==1;
        end
    else
        begin
            next_state=current_state;
            soda=0;
        end
//in this state the empty bottles are filled with soda
soda_filling:
    if(soda==1&& soda_filling=0&& verification==1&& bottle_verify==1)
        begin
            next_state=soda_verification;
            soda=0;
            bottle_verify=0;
            soda_filling=1;

```

labeling

```
        end
    else
    begin
        next_state=current_state;
        soda_filling=0;
    end

    //in this state the soda bottles are verified for shape and size.
    //if they are verified as okay then bottles are sent to next state which is capping and
    //else they are sent into trash and are re-cycled

soda_verification:
    if(soda_filling==1&& bottle_verify==0; verification==1)
    begin
        next_state=capping_labeling;
        bottle_verify=1;
        soda_filling=0;
        cap=0;
    end
    else
    begin
        next_state=trash;
        bottle_verify=1;
        empty_bottles=1;

    //in this state the soda bottles are capped and labeled.
    Capping_labeling:
    If(bottle_verify==1&cap=0&verification==1)
    Begin
        Next state=final verification;
```



```

        Cap=1;
        Bottle_verify=0;
    End
Else
Begin
    Next_state=capping labeling
    Cap=0;
    Bottle_verify=1;
    Verification=1;
End
//in this state the last and final verification is done.
//if they are verified as okay then bottles are sent to next state which is packing
//else they are sent into trash and are re-cycled
Final_verification:
    If(cap==1&bottle_verfiy==0&verification==1)
Begin
    Next state=packing;
    Bottle_verify=1;
    cap=0;
    packing=0;
End
Else
Begin
    Next_state=trash;
    Cap=0;
    Bottle_verify=1;
End
//in this state the bottles are packed
Packing:

```

If(bottle_verify==1&packing=0&verification==1)

Begin

Next state= empty_bottles;

packing=1;

Bottle_verify=0;

Empty_bottles=0;

Trash=0;

End

Else

Begin

Next_state=packing;

packing=0;

Bottle_verify=1;

End

//in this state the failed bottles are recycled and sent into the first state.

Trash:

If(verification==0&&bottle_verify==1&&trash=1)

Begin

Next_state= empty bottles;

Trash=0;

Bottle_verify=0;

End

Else

Begin

Next state=trash;

Trash=1;

Packing=0;

Bottle_verify=1;

end